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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

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Applicant's or agent's file reference 432725GA FOR FURTHER AG	See Notifi Preliminary	cation of Transmittal of Internatio Examination Report (Form PCT/IPEA/4)
International application No. International filing da PCT/EP2003/006566 23 June 2003		Priority date (day/month/year) 28 June 2002 (28.06.2002)
International Patent Classification (IPC) or national classification ar G01N 33/543	d IPC	
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Internal, application No.

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	the international	application as originally filed	•	
$\overline{\times}$	the description,	pages1-14	, as originally filed,	•
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YES

NO

V.	Reasoned statement under Articitations and explanations supp		inventive step or industrial appl	
1.	Statement			
	Novelty (N)	Claims	1-14	YES
		Claims		NO
	Inventive step (IS)	Claims	1-14	YES
		Claims		NO .

Citations and explanations

Industrial applicability (IA)

This report makes reference to the following documents:

Claims

Claims

Claims

D1: US 4 655 880 (cited in the application)

D2: US2001/0029048 A1

D3: US 5 149 629 (cited in the application)

D4: US 4 315 753 (cited in the application)

D5: US 5 217 112

Novelty - independent claims 1 and 12: 1.2

D2, which is regarded as the closest prior art, discloses a device (see figures 1 and 2) for the electrochemical detection of at least one type of biochemical molecule contained in a liquid from a group of predetermined biochemical molecules of different types (paragraph 1, lines 1 and 2), said device having at least one reference electrode 26 (paragraph 9, line 9) and at least one counter electrode 28 (paragraph 9, line 9) and more than two working electrodes 22, 24 (paragraph 9, lines 7 and 8, paragraph 4, paragraph 38, lines 8 to 11) having means 10, 12 for receiving the liquid (paragraph 9, lines 1 and 2).

The following features of claim 1 (and the corresponding features of claim 12) are not disclosed BEST AVAILABLE COPY

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in D2:

- "for detecting each type of biochemical molecule, at least one working electrode is provided which is coated with a molecule that is complementary to the biochemical molecule to be detected" (in D2, said molecules are not arranged on the corresponding working electrode, but on a substrate next to the working electrode at a certain distance, see paragraph 38);
- "a potentiostat for generating a predetermined voltage curve between the working electrodes and the reference electrode, this voltage curve being alterable during the measurement," (in D2, a separate potentiostat is used for each working electrode, see paragraph 24; the applied voltage is kept constant, see paragraph 26);
- "a <u>current-voltage converter</u> is <u>connected</u>

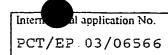
 <u>downstream</u> of each of the working electrodes, the

 current-voltage converters keep all of the working

 electrodes at the same potential" (current-voltage

 converters are not mentioned in D2).

D1 discloses (see, in particular, figure 6 and the corresponding description) a device of the aforementioned type for the electrochemical detection of a biochemical molecule contained in a liquid, only two working electrodes being provided, of which only one is correspondingly coated; the other one is used for background compensation. Although the voltage between the working electrodes and the reference electrode is generated by only one potentiostat, this potentiostat keeps the applied voltage constant. A current-voltage converter is connected downstream of each of the two working electrodes.

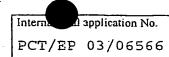


D3 also discloses (see figure 1 and the corresponding description) a device of the aforementioned type for the electrochemical detection of a biochemical molecule contained in a liquid, said device having a plurality (example 8; of correspondingly coated working electrodes and only one potentiostat. The potentiostat keeps the working electrodes at a constant potential. Current-voltage converters connected downstream of the working electrodes are not disclosed (in order to be able to read out the working electrodes with only one potentiostat, these working electrodes are connected to a multiplexer and read out serially).

D4 discloses a device for simultaneously measuring NO₂ and NO, this device <u>not</u> being suitable for detecting a biochemical molecule in a liquid. The device has only <u>two</u> working electrodes that are <u>not</u> coated. The potentiostat used there keeps the working electrodes at a <u>constant</u> potential.

ps discloses a device for detecting ions and gases in a liquid, this device not being suitable for detecting a biochemical molecule in a liquid.

Although the device has a plurality (example 5) of working electrodes, these electrodes are not coated, but consist of different materials (for example, C, Au, Ag, Ni, Pt). A voltage curve that can be altered during the measurement is generated at the working electrodes with only one potentiostat, but, in contrast to the present application, the voltage curve is generated between the working electrodes and the counter electrode, not between the working electrodes and the reference electrode (see D5,



column 3, lines 11-17). Current-voltage converters connected downstream of the working electrodes are not mentioned.

Claims 1 and 12 therefore meet the requirement of novelty under PCT Article 33(2).

1.3 Inventive step - independent claims 1 and 12:

Proceeding from D2, the problem addressed by the invention is that of providing a device and a method with which simultaneous electrochemical detection of different biochemical molecules contained a liquid can be carried out with the lowest expenditure on apparatus possible and with the greatest accuracy possible.

The invention solves the problem by the combination of features in claim 1 and claim 12.

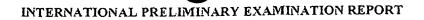
A person skilled in the art knows to coat electrodes correspondingly (D1, D3). A person skilled in the art also knows to use only one potentiostat for a plurality of working electrodes and to read out the working electrodes by means of current-voltage converters (D1). However, a person skilled in the art does not know, in connection with the detection of biochemical molecules, to generate a voltage curve that can be altered during the measurement at the working electrodes. In order to arrive at the subject matter of the application, a person skilled in the art would have to combine (at least) three documents (D2 + D1 + D5). This, however, would amount to an expost-facto analysis, since there is nothing in these documents that would suggest combining them. It is therefore uncertain whether a person skilled in the art of biochemical analytics would even consult D5, which relates to the detection of (inorganic) ions and gases. Even if a person skilled in the art were

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to combine these three documents, there would still be an additional difference with respect to the claimed subject matter of the present application, namely that said voltage curve would have to be generated between the working electrodes and the reference electrode to be the same as the application.

Claims 1 and 12 therefore meet the requirement of inventive step under PCT Article 33(3).

- 1.4 Claims 2 to 11 and 13 and 14 are dependent on claims 1 and 12, respectively, and therefore also meet the requirements of PCT Article 33(1).
- 2. For the sake of completeness, the following formal defects should be noted:
 - (i) the features "a second operational amplifier" (claim 9, claim 1 does not define a "first operational amplifier"), "a third operational amplifier", "a second resistor", "of the second operational amplifier" and "a third resistor" (claim 10) are not previously defined. These claims therefore appear to be unclear (PCT Article 6).
 - (ii) Moreover, the claims also appear to be unclear owing to contradictions in the description (see PCT International Preliminary Examination Guidelines, Chapter III, paragraph 4.3): page 12, lines 22-23, contradicts the present claims, since neither a circuit per se nor a device with only uncoated working electrodes is claimed.
 - (iii) Independent device claim 1 has not been drafted in the two-part form under PCT Rule 6.3(b).
 - (iv) Claim 13 should refer back to claim 12, not to itself.



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- (v) Contrary to PCT Rule 5.1(a)(ii), the description does not cite D2 or indicate the relevant prior art disclosed therein.
- (vi) The description has not been brought into line with the amended claims (PCT Rule 5.1(a)(iii)).
- (vii) Reference sign "1" for the "container" (see,
 for example, page 9, line 26) has not been
 included in the figures. This reference sign
 should therefore be deleted from the
 description.